User Guide

HDMI Extenders

DTP HDMI 230 D

HDMI Twisted Pair Extender
Transmitters and Receivers

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-2366-01 Rev. B
07 13

Safety Instructions

Safety Instructions • English

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Korean

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NOTE: The Twisted Pair Extension technology works with unshielded twisted pair (UTP) or shielded twisted pair (STP) cables; but, to ensure FCC Class A and CE compliance, STP cables and STP connectors are required.

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The following notifications are used in this guide:

WARNING: A warning indicates a situation that has the potential to result in death or severe injury.

CAUTION: A caution indicates a situation that may result in minor injury.

ATTENTION: Attention indicates a situation that may damage or destroy the product or associated equipment.

NOTE: A note draws attention to important information.

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Introduction

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About this Guide

This guide describes the Extron DTP HDMI 230 D family of High-Definition Multimedia Interface (HDMI™) Extenders, which consists of DTP HDMI 230 D transmitters and DTP HDMI 230 D receivers. This guide describes how to install, operate, and configure them.

About the DTP HDMI 230 D Extenders

The Extron DTP HDMI 230 D extenders are a family of HDMI transmitters and receivers (see figure 1) which are housed in enclosures that can be mounted in Underwriters Laboratories (UL) standard wall boxes with Decora®-style face plates. A transmitter and receiver pair extends the usable distance of HDMI digital video and RS-232 or IR control signals over one Category (CAT) 5e, 6, 6a, or 7 unshielded twisted pair (UTP) or shielded twisted pair (STP) cable. The DTP HDMI 230 D transmitter and receiver also route audio. The video, control, and audio (if applicable) signals can be transmitted up to 230 feet (70 m).

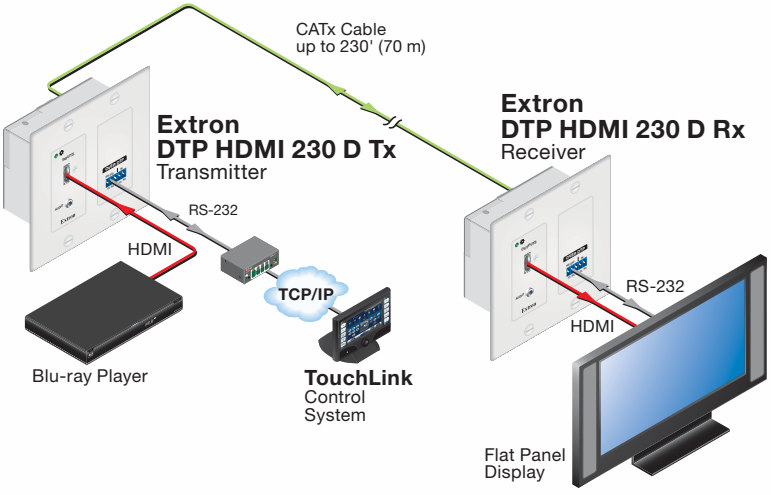


Figure 1. Typical Transmitter and Receiver Application

A DTP HDMI 230 D system consists of a transmitter (Tx) and a receiver (Rx). The pair can handle a single HDMI digital video signal and a bidirectional RS-232 or IR link.

The DTP HDMI 230 D transmitter and receiver are sold separately. Each purchased transmitter is shipped with a single external desktop 12 VDC power supply that accepts 100 to 240 VAC, 50-60 Hz input. A single power supply connected to either the transmitter or the receiver can power both units through the twisted pair cable that links the units.

Twisted Pair Cable Advantages

Twisted pair cable is much smaller, lighter, more flexible, and less expensive than coaxial or HDMI cable. These transmitter and receiver twisted pair (TP) products make cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical (see **Connector and Cable Details** on page 10 for more information).

NOTE: Do **not** use Extron UTP23SF-4 Enhanced Skew-Free AV UTP cable or STP201 cable to link the transmitter and receiver. The DTP HDMI 230 Tx/Rx does not work properly with these cables.

Control communications

The RS-232 or infrared (IR) communications are pass-through only. The transmitter and receiver do not generate or respond to these signals.

Transmission Distance

The maximum transmission distance is determined by the resolution of the signal and the twisted pair cable, graphics card, and display used in the system.

- **With CAT 5e, 6, 6a, or 7 UTP or STP cable**, the DTP HDMI 230 D transmitters and receivers can transmit and receive 720p, 1080i or 1080p HDTV video signals up to 230 feet (70 m).

Features

Transmits single link HDMI-D signals over one CAT 5e, 6, 6a, or 7 cable — Standard twisted pair cables provide an economical, easily installed cable solution.

Supports DDC and HDCP transmission — The DTP HDMI 230 D transmitters and receivers fully support long distance transmission of the DDC and HDCP signals.

Control communications pass-through — Bidirectional RS-232 or IR control signals can be transmitted alongside the HDMI signal, so that the remote display can be controlled without the need for additional cabling.

Audio routing — The DTP HDMI 230 D transmitters and receivers also route unbalanced stereo audio.

Supports CEC signal transmission

Wall-mountable enclosures

External 100 VAC to 240 VAC, 50-60 Hz, international power supply — Included with transmitters.

Remote powering of the transmitter or receiver — Only one power supply is necessary to power both devices.

Installation and Operation

This section describes the installation and the operation of the DTP HDMI 230 D, including:

- **Mounting the Transmitter or Receiver**
- **Transmitter Connections**
- **Receiver Connections**
- **Connector and Cable Details**
- **Power Supply Wiring**
- **RS-232 and IR Connector Wiring**
- **Operation**
- **Ground Loops**

Mounting the Transmitter or Receiver

ATTENTION: Installation and service must be performed by experienced personnel.

Decora Unit Mounting

The DTP HDMI 230 D transmitter and receiver can be installed in a two-gang electrical wall box, or with a mud ring, with a Decora wall plate cover (supplied).

The installation must conform to national and local building, electrical, and safety codes and to the size requirements of the wall plate.

UL and safety guidelines

The following UL guidelines pertain to the installation of the Decora transmitters and receivers into a wall or furniture.

- These units are not to be connected to a centralized DC power source or used beyond their rated voltage range.
- These units must be installed in UL-listed wall boxes.
- These units must be installed with conduit in accordance with National Electrical Code.

Site preparation and wall box installation

Choose a location that allows cable runs without interference. Allow enough depth for both the wall box and the cables. Install the cables into the wall, furniture, or conduits before installing the wall plate.

NOTE: The Decora units are very deep and have connectors on the back side. Extron recommends a 2-gang wall box which has a depth of at least 3.0 inches (7.6 cm) to accommodate the connectors and cables.

To install a new wall box, perform steps 1 through 9. If a suitable wall box is already installed, perform steps 6 through 9 on the next page. UL-listed wall boxes are recommended.

1. If a wall box is not available to use for a template, use the **Decora Template Dimensions** on page 15 to create a template. If installing directly into furniture, cut out the center portion of the template.
2. Place the wall box (or the template) against the installation surface, and mark the opening guidelines.
3. Cut out the material from the marked area.
4. Insert the wall box into the opening. The rear connectors on the box or wall plate should fit easily into the opening. Enlarge or smooth the edges of the opening if needed.
5. Secure the wall box with nails or screws, leaving the front edge flush with the outer wall or furniture surface (see figure 2).

NOTES:

- If attaching the wall box to wood, use four #8 or #10 screws or 10-penny nails. A minimum of 0.5 inch (1.3 cm) of screw thread must penetrate the wood.
- If attaching the wall box to metal studs or furniture, use four #8 or #10 self-tapping sheet metal screws or machine bolts with matching nuts.

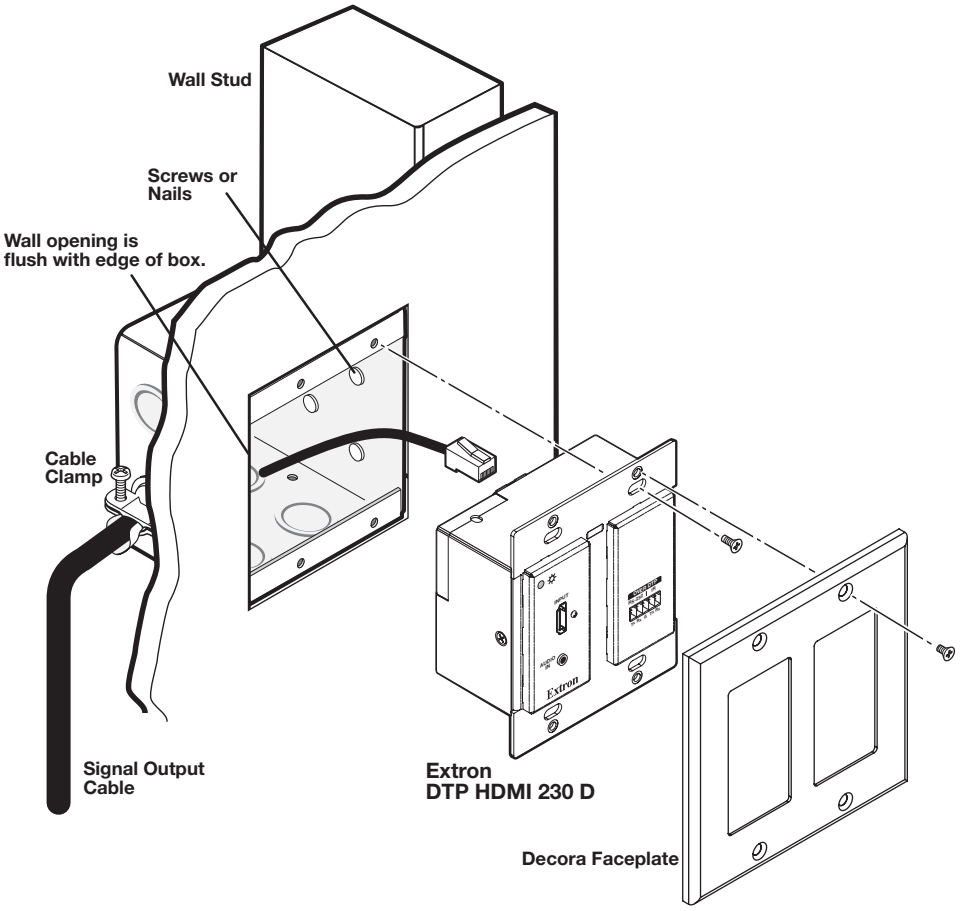


Figure 2. Installing the Wall Box and Mounting the Unit

6. Feed the twisted pair cables and, if applicable, the power cables through the opening and through the wall box punch-out holes, securing them with cable clamps to provide strain relief.

   NOTES:

   - In order to fit in the wall box, the twisted pair cables and RJ-45 connectors should not have a boot installed.
   - One power supply can power both the transmitter and the receiver, so only one unit needs a power supply (see **Power Supply Wiring** on page 11 and **Ground Loops** on page 14.

7. Trim back and insulate exposed cable shields with heat shrink to reduce the chance of short circuits.

   To prevent short circuits, the outer foil shield can be cut back to the point where the cable exits the cable clamp.

8. Connect the cables to the rear of the unit.
9. Connect front panel devices (see **Connections** on page 6 for connector details), restore the power supply, and test the transmitter and receiver system. Make any cabling adjustments before final installation, as the cables will be inaccessible afterwards.

Mud ring installation

1. Using the mud ring as a guide, mark the edges and cut out the material within the marked area.
2. Insert the mud ring into the opening, rotate and secure the locking arms with the supplied screws shown in figure 3.
3. Follow steps 6 through 9 of **Site preparation and wall box installation** above, and **Final installation** on the next page.

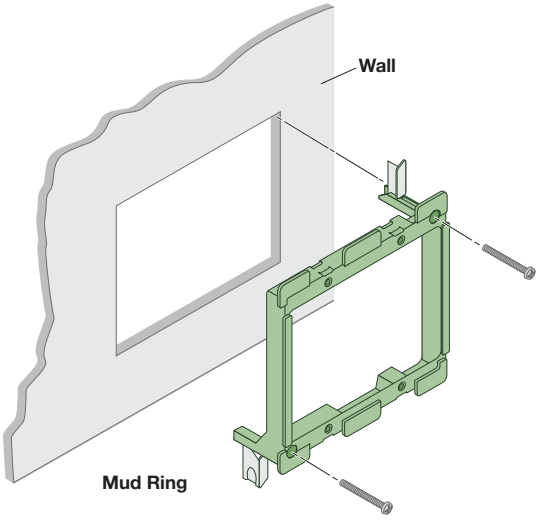


Figure 3. Installing the Mud Ring

Final installation

After testing and making any adjustments, do the following:

1. At the power outlet, unplug the power supply.

   NOTE: One power supply can power both the transmitter and the receiver (see **Power Supply Wiring** on page 11 and **Ground Loops** on page 14).

2. Mount the transmitter or receiver into the wall box or mud ring, and attach the supplied Decora faceplate to the unit (see **figure 2** on page 4).
3. At the power outlet, reconnect the power supply. This powers up both units.

Transmitter Connections

The DTP HDMI 230 D transmitter is in an enclosure that can be mounted in UL-listed standard wall boxes with Decora-style face plates.

Transmitter Front Panel

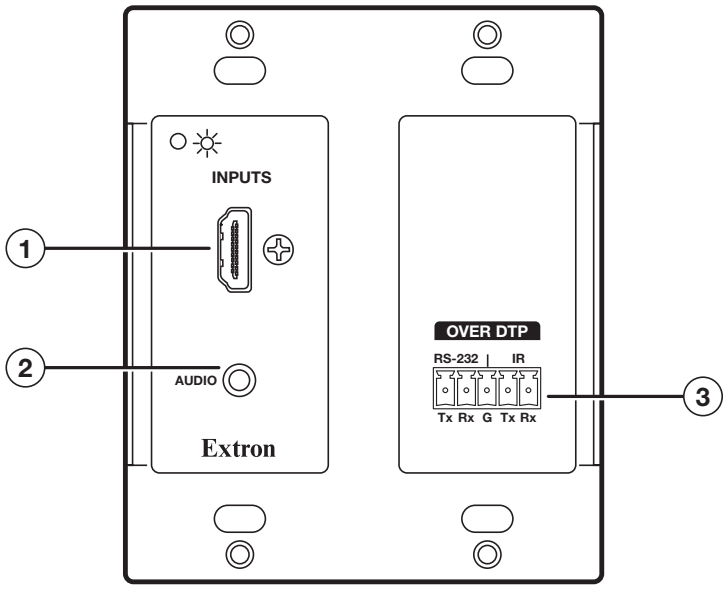


Figure 4. DTP HDMI 230 D Transmitter Front Panel Connectors

(1) **HDMI input connector** — Connect an HDMI cable between this port and the HDMI output port of the digital video source.

(2) **Audio input** — Connect an unbalanced stereo audio source to this 3.5 mm mini stereo jack. Figure 5 shows how to wire the audio plug.

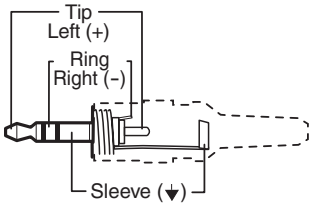


Figure 5. Audio Input Connector Wiring

③ **RS-232/IR (Control) pass-through connector** — Connect a serial communications port to this 3.5 mm, 5-pole captive screw connector for bidirectional RS-232 communication (see **RS-232 and IR connector wiring** on page 12 to wire the connector).

NOTE: The RS-232 connector can also transmit one-way modulated infrared (IR) signals.

Transmitter Rear Panel

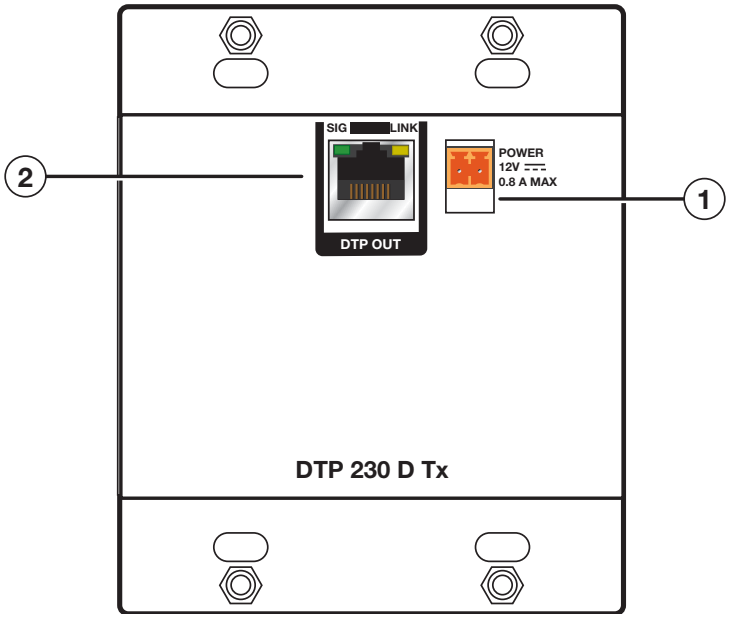


Figure 6. DTP HDMI 230 D Transmitter Rear Panel Connectors

① **DC power input connector** — Plug the included external 12 VDC power supply into either this 2-pole connector (see **Power supply wiring** on page 11 to wire the power connector) or the power input connector on the receiver (see ② on the following page).

② **Transmitter output port** — Connect one end of the twisted pair cable to the RJ-45 connector on the transmitter (see **Connector and Cable Details** on page 10 to properly wire the RJ-45 connectors).

ATTENTION: Do not connect this device to a telecommunications or computer data network.

Receiver Connections

The wall-mountable receiver is in an enclosure that can be mounted in UL-listed standard wall boxes with Decora-style face plates.

Receiver Rear Panel

Figure 7 shows the rear panel of the DTP HDMI 230 D receiver.

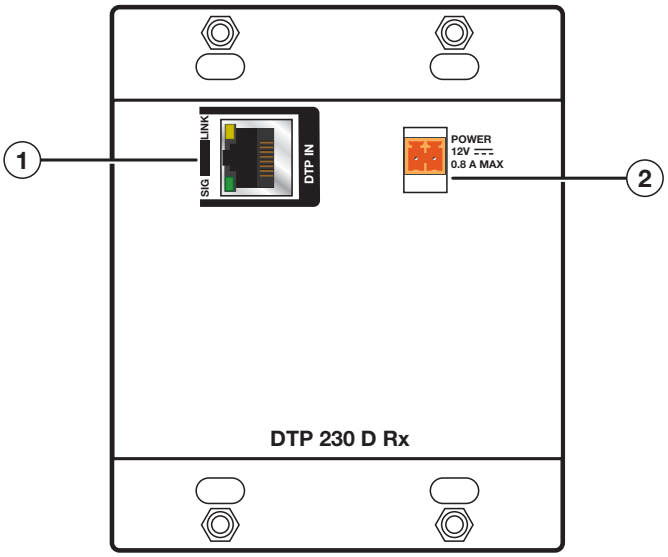


Figure 7. DTP HDMI 230 D Receiver Rear Panel Connectors

① **Receiver input ports** — Connect the opposite end of the twisted pair cable from the transmitter output connector (see ② on the previous page) to this RJ-45 connector (see **Connector and Cable Details** on page 10 to properly wire the RJ-45 connectors).

ATTENTION: Do not connect this device to a telecommunications or computer data network.

② **DC power input connector** — Plug the included external 12 VDC power supply into either this 2-pole connector (see **Power Supply Wiring** on page 11 to wire the power connector) or the power input connector on the transmitter (see ① on the previous page).

Receiver Front Panel

Figure 8 shows the front panel of the DTP HDMI 230 D receiver.

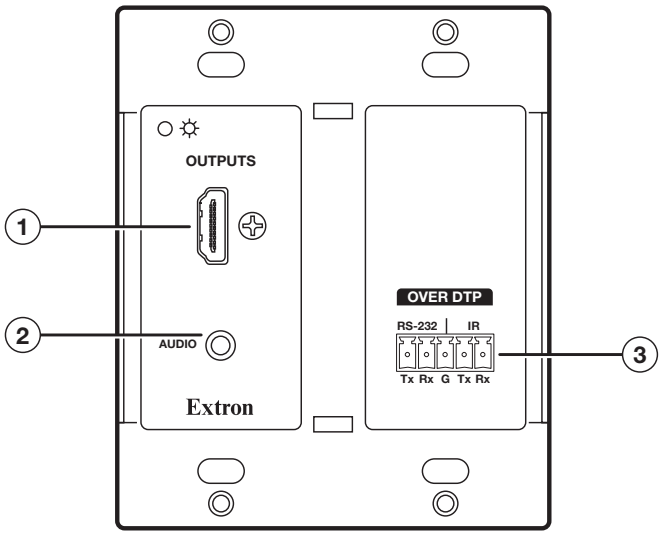


Figure 8. DTP HDMI 230 D Receiver Front Panel Connectors

① **HDMI output connector** — Connect an HDMI display for the transmitted direct digital image.

② **Audio output connector** — Connect a stereo audio device to this 3.5 mm mini stereo jack to receive the unbalanced audio output (see **figure 5** on page 7 for wiring details).

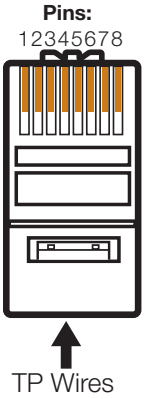
③ **RS-232 and IR (control) pass-through connector** — Connect a serial communications port to this 3.5 mm, 5-pole captive screw connector for bidirectional RS-232 communication (see **RS-232 and IR Connector Wiring** on page 12 to wire the connector).

NOTE: The RS-232 connector can also transmit one-way modulated infrared (IR) signals.

Connector and Cable Details

TP Cable Termination and Recommendations

Figure 9 details the recommended termination of both ends of TP cables with RJ-45 connectors in accordance with the **TIA/EIA T 568B** wiring standard.



Pin	TIA/EIA T 568 B Wire color
1	White-orange
2	Orange
3	White-green
4	Blue
5	White-blue
6	Green
7	White-brown
8	Brown

Figure 9. TP Cable Termination

NOTE: Do **not** use Extron UTP23SF-4 Enhanced Skew-Free AV UTP cable or STP201 cable to link the transmitter and receiver. The DTP HDMI 230 D Tx/Rx does not work properly with these cables.

Supported cables —

The DTP HDMI 230 D is compatible with CAT 5e, 6, 6a, and 7 shielded twisted pair (F/UTP, SF/UTP, and S/FTP) and unshielded twisted pair (U/UTP) cable.

Cable recommendations —

Extron recommends using the following practices to achieve full transmission distances up to 230 feet (70 m) and reduce transmission errors.

- Use the following Extron XTP DTP 24 SF/UTP cables and DTP 24 connectors for the best performance:
  - **XTP DTP 24/1000** Non-Plenum 1000’ (305 m) spool 22-236-03
  - **XTP DTP 24P/1000** Plenum 1000’ (305 m) spool 22-235-03
  - **XTP DTP 24 Plug** Package of 10 101-005-02
- If not using XTP DTP 24 cable, at a minimum, Extron recommends 24 AWG, solid conductor, STP cable with a minimum bandwidth of 400 MHz.
- Terminate cables with shielded connectors to the TIA/EIA T 568 B standard.
- Use no more than two pass-through points, which may include patch points, punch down connectors, couplers, and power injectors. If these pass-through points are required, use CAT 6 or 6a shielded couplers and punch down connectors.

NOTE: When using CAT 5e and CAT 6 cable in bundles or conduits, consider the following:

- Do not exceed 40% fill capacity in conduits.
- Do not comb the cable for the first 20 meters, where cables are straightened, aligned, and secured in tight bundles.
- Loosely place cables and limit the use of tie wraps or Velcro®.
- Separate twisted pair cables from AC power cables.

Power Supply Wiring

NOTES:

- Only one power supply is required. A single power supply connected to either unit in the pair powers both units.
- A power supply is included with each individually-packaged transmitter.

Figure 10 shows how to wire the connector. Snap the provided ferrite bead onto the DC power cable, between the power supply and the connector on the HDMI unit.

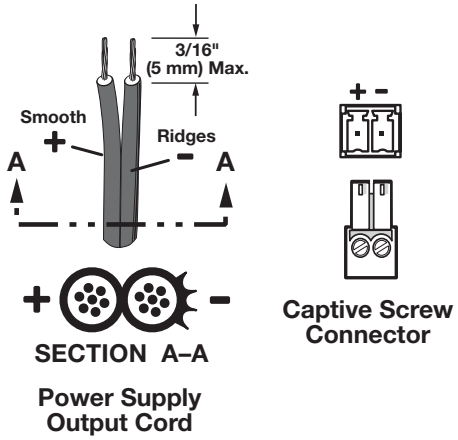


Figure 10. Power Connector Wiring

WARNING: The two power cord wires must be kept separate while the power supply is plugged in. Remove power before wiring.

ATTENTION:

- Always use a power supply supplied and or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product. Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.
- Power supply voltage polarity is critical. Incorrect voltage polarity can damage the power supply and the unit. The ridges on the side of the cord (see figure 10) identify the power cord negative lead.
- To verify the polarity before connection, plug in the power supply with no load and check the output with a voltmeter.
- The length of the exposed (stripped) copper wires is important. **The ideal length is 3/16 inch (5 mm)**. Longer bare wires can short together. Shorter wires are not as secure in the connectors and could be pulled out.

NOTE: Do not tin the power supply leads before installing them in the direct insertion connector. Tinned wires are not as secure in the connectors and could be pulled out.

RS-232 and IR Connector Wiring

Figure 11 shows how to wire the RS-232 and IR connector for the DTP HDMI 230 D units.

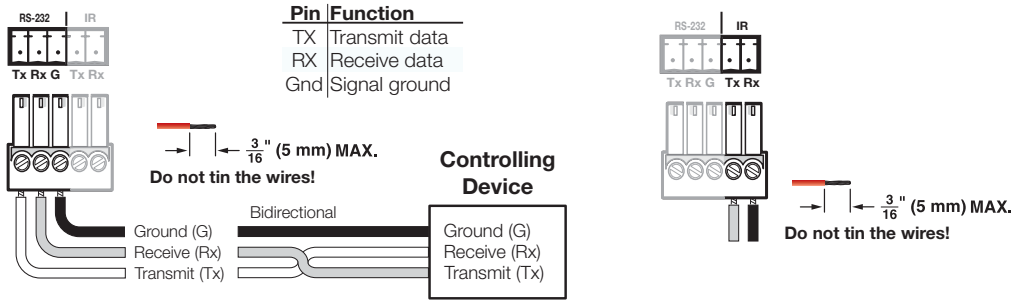


Figure 11. RS-232 and IR Connector Wiring

ATTENTION: The length of the exposed (stripped) copper wires is important. **The ideal length is 3/16 inch (5 mm)**. Longer bare wires can short together. Shorter wires are not as secure in the connectors and could be pulled out.

NOTE: Do not tin the power supply leads before installing them in the direct insertion connector. Tinned wires are not as secure in the connectors and could be pulled out.

Operation

Figure 12 shows the power indicator on the Decora transmitter.

NOTE: Both transmitter and receiver have power indicators in the location shown.

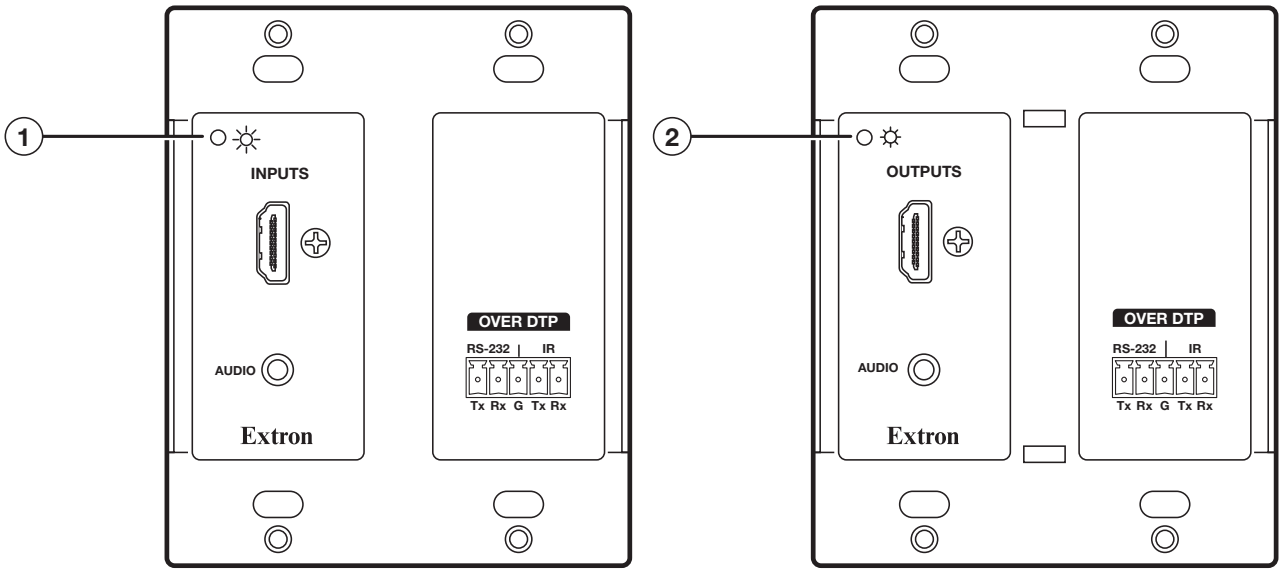


Figure 12. DTP HDMI 230 D Transmitter and Receiver Power Indicators

Transmitter Power Indicator

① **Power LED** — This two-color front panel LED lights to indicate signal and power status as follows:

- **Amber** — The unit is receiving power but no signal on the HDMI input.
- **Green** — The unit is receiving power and a signal is present on the HDMI input.

Receiver Power Indicator

② **Power LED** — This two-color front panel LED lights to indicate signal and power status as follows:

- **Amber** — The unit is receiving power but no signal on the TP input.
- **Green** — The unit is receiving power and a signal is present on the TP input.

System Operation

After the transmitter, the receiver, and their connected devices are powered up, the system is fully operational. If any problems are encountered, ensure all cables are routed and connected properly.

NOTE: Ensure that the video source and display are properly connected to the transmitter and receiver pair, and that the transmitter, the receiver, and the display have power applied before power is applied to the video source. If all other devices are not turned on before the video source, the image may not appear.

Ground Loops

When installing the DTP HDMI 230 D series products, be sure to avoid scenarios where the ground potential differs greatly between the locations where the DTP transmitter and DTP receiver are installed. Such situations can cause ground loops, which can result in image drops, no image, or damage to the units. If such installations cannot be avoided, it is necessary to isolate the ground between the DTP transmitter and receiver.

NOTES:

- Grounding DTP series units will disable analog audio transmission and the remote power feature.
- Both DTP transmitter and receiver will need to be powered locally.

To eliminate a ground loop:

1. Remove all screws on the left, right, and top of both the DTP transmitter and receiver units.
2. Remove the rear enclosure of each unit.
3. Locate and remove shunt jumpers at locations labeled JMP2 and JMP3 on both transmitter and receiver (see figure 13 for jumper locations).

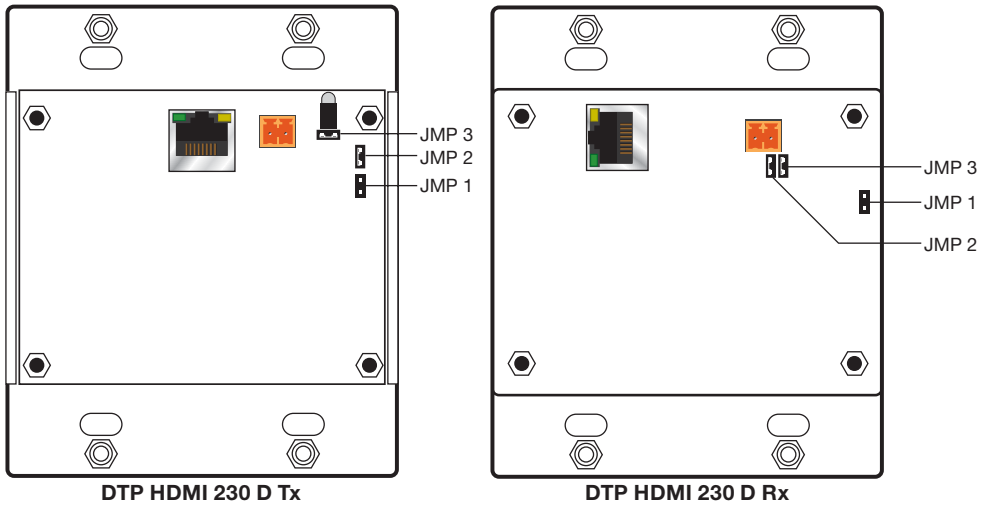


Figure 13. DTP HDMI 230 D Internal Jumper Locations

4. Replace the rear enclosures and screws.
5. Install units with an external power supply placed at each end.
6. Use UTP cable between the DTP transmitter and receiver. If STP cable has already been installed and terminated, disconnect the shielding at one end to discontinue the ground path.

Reference Information

This section includes decora template dimensions for installation of the DTP HDMI 230 D transmitters and receivers.

Decora Template Dimensions

To create a template, use the dimensions shown on figure 14.

NOTES:

- The drawing is not full size or to scale. **DO NOT** scale up or print to use as a template.
- Full size templates are available online at **www.extron.com**.

Template for the 2-gang mounting bracket

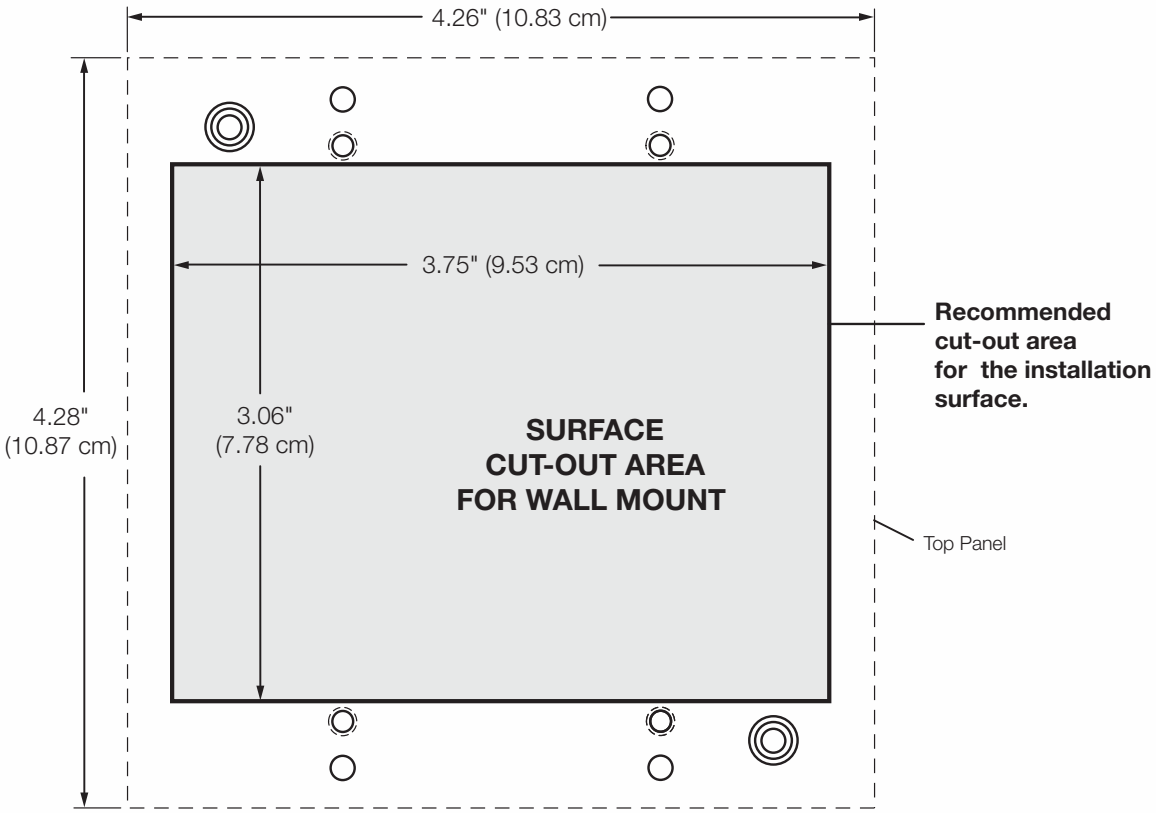


Figure 14. Decora Template Dimensions

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1230 South Lewis Street
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U.S.A.

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Chiyoda-ku, Tokyo 102-0082
Japan

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The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia Pte Ltd
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
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This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: 714.491.1500 or 800.633.9876
Asia: 65.6383.4400
Europe: 31.33.453.4040
Japan: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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